Contents

Part I  Introduction

1  Seed Development: A Comparative Overview on Biology of Morphology, Physiology, and Biochemistry Between Monocot and Dicot Plants ................................................................. 3
   Paolo A. Sabelli

2  Proteomics Reveals A Potential Role of the Perisperm in Starch Remobilization During Sugarbeet Seed Germination ............ 27
   Julie Catusse, Claudette Job and Dominique Job

3  Omics Platforms: Importance of Twenty-First Century Genome-Enabled Technologies in Seed Developmental Research for Improved Seed Quality and Crop Yield .................. 43
   Ryan D. Syrenne, Weibing Shi, Charles N. Stewart and Joshua S. Yuan

Part II  Transcriptomics

4  Rice Seed Development: Highly Resolved Transcriptomic Views ...... 61
   Tie Liu, S. Lori Tausta, Neeru Gandotra and Timothy Nelson

5  A Transcriptional Roadmap for Seed Development in Maize .............. 81
   Guifeng Wang, Gang Wang, Fei Wang and Rentao Song

6  Using Transcriptomics to Reveal Gene Networks of Seed Development in Arabidopsis ................................................................. 99
   Richard C. Macknight, Rowan P. Herridge and Robert C. Day

7  The Medicago truncatula Gene Expression Atlas (Mtgea):
   A Tool for Legume Seed Biology and Biotechnology ........................... 111
   Jerome Verdier, Vagner A. Benedito and Michael K. Udvardi
Contents

8 Transcriptomics of Legume Seed:
Soybean a Model Grain Legume ......................................................... 129
  Sangeeta Dhaubhadel and Frédéric Marsolais

9 Peanut Seed Development: Molecular Mechanisms
of Storage Reserve Mobilization and Effect of Water Deficit
Stress on Seed Metabolism ........................................................... 143
  Kameswara Rao Kottapalli, Pratibha Kottapalli and Paxton Payton

10 Probing the Genes Expressed in Developing Seed
of Oilseed Plants: Brassica Napus (L.) as A Case Example ............. 171
  Sreekala Chellamma, Bhinu Pillai and Abdelali Hannoufa

11 Networks of Seed Storage Protein Regulation
in Cereals and Legumes at the Dawn of the Omics Era ............... 187
  Jerome Verdier and Richard D. Thompson

Part III Proteomics

12 Organelle Proteomics of Developing Seeds:
Comparison with Other Plant Tissue Organelles ......................... 213
  Ombretta Repetto and Karine Gallardo

13 Proteomics in Identifying New Regulatory Mechanisms
Involved in Seed Development and Ultimately Seed Quality ....... 247
  Jean-Louis Prioul, Domenica Manicacci, Catherine Damerval
  and Valérie Méchin

14 Digging Deeper into the Seed Proteome:
Prefractionation of Total Proteins ................................................. 265
  Ján A. Miernyk and Mark L. Johnston

15 The Central Role of Phosphoenolpyruvate Metabolism
in Developing Oilseeds ............................................................... 279
  William C. Plaxton and Brendan O’Leary

Part IV Metabolomics

16 Search for Low-Molecular-Weight Biomarkers in Plant
Tissues and Seeds Using Metabolomics: Tools, Strategies,
and Applications ........................................................................ 305
  Guillaume Marti, Matthias Erb, Serge Rudaz, Ted Turlings
  and Jean-Luc Wolfender
Contents

Part V Towards Systems Biology: Organization, Integration and Modelization of Data

17 Plant Metabolic Pathways: Databases and Pipeline for Stoichiometric Analysis .............................................................. 345
   Eva Grafahrend-Belau, Björn H. Junker and Falk Schreiber

18 Coupled Transcript-Metabolite Profiling: Towards Systems Biology Approaches to Unravel Regulation of Seed Secondary Metabolism ............................................................. 367
   Thierry Joët, Eleanore T. Wurtzel, Fumio Matsuda, Kazuki Saito and Stéphane Dussert

19 Using Systems Approaches to Analyze Metabolic Networks Involved in Storage Reserve Synthesis in Developing Seeds .............. 387
   Christian Krach, Eva Grafahrend-Belau, Hart Poskar, Kai Schallau, Falk Schreiber and Björn H. Junker

20 Metabolic Specialization of Maternal and Filial Tissues .................. 407
   Hélène Zuber, Mélanie Noguero, Christine Le Signor, Richard Thompson and Karine Gallardo

Part VI Discovery-Driven Seed and Yield Improvement

21 Marker-Aided Breeding Revolutionizes Twenty-First Century Crop Improvement ................................................................. 435
   Rodomiro Ortiz

22 Metabolomics-Assisted Crop Breeding Towards Improvement in Seed Quality and Yield ....................................................... 453
   David Toubiana and Aaron Fait

23 A Role for “Omics” Technologies in Exploration of the Seed Nutritional Quality ............................................................... 477
   Marc Galland, Imen Lounifi, Gwendal Cueff, Aurélie Baldy, Halima Morin, Dominique Job and Loïc Rajjou

24 Using Genome-Enabled Technologies to Address Allergens in Seeds of Crop Plants: Legumes as a Case Study ..................... 503
   Lena Y. C. Soo, Nicole E. Walczyk and Penelope M. C. Smith
25 Improving Quality and Content of Oils in Seeds: Strategies, Approaches, and Applications Towards Engineering New Oilseed Crop Plants ................................................. 527
Thomas Roscoe, Frédéric Domergue, Martine Devic and René Lessire

26 Integrating Omics in Food Quality and Safety Assessment .......... 555
Howard Davies and Louise Shepherd

Index ........................................................................................................... 569
Seed Development: OMICS Technologies toward Improvement of Seed Quality and Crop Yield
OMICS in Seed Biology
Agrawal, G.K.; Rakwal, R. (Eds.)
2012, XL, 576 p., Hardcover
ISBN: 978-94-007-4748-7